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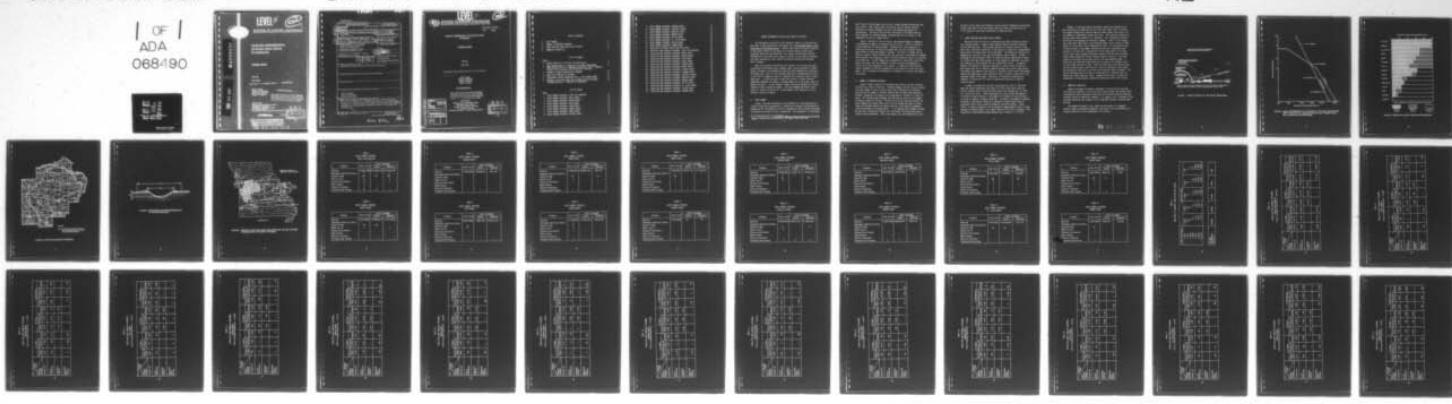
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**DAMAGE ASSESSMENTS
OF BLAST-RISK AREAS
IN MISSOURI**

TECHNICAL REPORT

SPC 431

April 1979

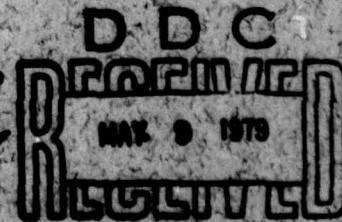
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**Earl V. Sager
Mickey O. Marshall
Charles W. Hulbert
Roger J. Sullivan**

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Mr. Clifford E. McLain
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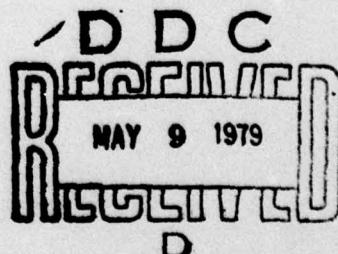
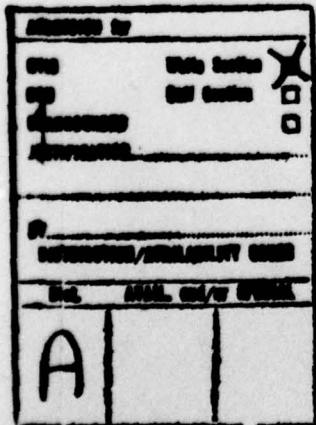


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DAMAGE ASSESSMENTS OF BLAST-RISK AREAS IN MISSOURI

The information contained in this technical report is extracted from data used in the preparation of SPC Report 409, Civil-Defense Needs of High Risk Areas of the United States.¹ Whereas that report provided an analysis of the overall effect on the nation of a nuclear attack, particularly regarding fatalities and casualties, this report provides more detailed information on the "blast-risk" areas, by county, in the State of Missouri. The areas considered in this report are those surrounding the Whiteman Missile Complex.

Data are provided on fatalities and injuries in the blast-risk areas surrounding the Whiteman Missile Complex under varying programs of shelter and/or relocation; the assumptions governing these programs are outlined in SPC Report 409. Data are also provided that give a representative picture of the level of damage to specific categories of structures found in these same areas. It should be kept in mind that fallout, a highly variable phenomenon dependent on weather, although deadly to living things, does not damage structures. It may, however, render structures unusable for varying amounts of time, perhaps for months. The blast damage described in this report is similar to that which is anticipated to be incurred in all but the most limited of attacks.

A. BLAST DAMAGE

Figure 1 provides information on the effects of a 1-MT surface burst. Figure 3 shows the overpressure as a function of distance from the point of detonation for 1-MT weapons, both for a groundburst and an airburst designed to maximize the range of 10-psi overpressure. The groundburst is considered

¹R. J. Sullivan et al., Civil-Defense Needs of High Risk Areas of the United States, System Planning Corporation, SPC Report 409, March 1979.

most likely in the Whiteman area and has a higher maximum overpressure than the airburst. Most lightly built structures, such as houses, would be destroyed or severely damaged with only a few pounds-per-square-inch overpressure. The 55-psi blast shelters described in SPC Report 409 are quite adequate to withstand damage, assuming they are not located in the immediate vicinity of a weapon burst.

Tables 1 through 16 list, by county, the expected degree of damage to a representative sample of structures and facilities. Figure 3 provides a visual comparison of housing damage. Although only a few categories of structures are given, it should be assumed that similar structures nearby would suffer an equivalent amount of damage. The levels of damage that are used are "severe," which indicates that the structure is destroyed or rendered nearly useless, and "moderate," which indicates extensive repairs are required for further use. "Light" damage may be expected for some points within the blast-risk areas, but this category is highly variable and dependent on terrain and is not addressed in this report. It should be noted that the levels of damage to different categories do not necessarily track with each other. This is because of differences in "hardness" or distance from detonation points.

B. DAMAGE TO TRANSPORT NETWORKS

Figure 4 shows a portion of the major road arteries that pass through the blast-risk areas of Missouri. Although highway surfaces are only subject to direct damage if they lie within the crater produced by an explosion, there may be any number of indirect effects that can make them impassable. Bridges, overpasses, and tunnels can be destroyed or blocked as a result of blast. The limited access highways are particularly prone to such damage, and detour routes are limited. The missile silos are serviced primarily by state highways and county roads, and it can be assumed that many of these roads will be made useless by craters (see Fig. 5 for typical groundburst crater dimensions) or by heavy debris. It is expected that movement throughout the area, following an attack, will be sharply curtailed, which would inhibit rescue operations. Also, since power, gas, and communication lines

typically follow these road networks, service would be immediately terminated in many areas both inside and outside the blast zones and there would be little chance of short-term restoration of these services.

C. SHORT-TERM AND LONG-TERM FALLOUT EFFECTS

Massive fallout will occur in the blast-risk areas of Missouri following a nuclear attack. Figure 6 shows possible fallout radiation contours for the affected areas. While proper shelters will permit survival in the short term, continuous habitation in the heavily hit areas for a considerable period after the attack would not be advisable. The effects of fallout vary, depending on a person's size, age, and general state of health. Current knowledge of the biological effects of radiation permit predictions of death or illness from short-term exposure to large amounts of radiation, but long-term exposure to small amounts has less predictable results. In general, however, the effects of radiation absorbed in a short period of time are more severe than for an identical amount absorbed over a much longer period. The effects also depend on the quality of radiation, which varies from deeply penetrating gamma rays to beta radiation, which is usually restricted to the epidermal organs of the body. Absorption of radioactive substances by ingestion or inhalation will tend to concentrate radiation in specific internal organs.

A number of authorities consider that almost any level of radiation above the normal background rate (about 10^{-5} R/hr) from cosmic rays and natural radioactivity of the earth may produce some consequences, at least on a statistical basis. These consequences are very limited and appear in the form of slight increases in the number of incidences of various forms of cancer or perhaps in genetic mutations. Currently, the degree of exposure permitted in the nuclear industry is designed to reduce these risks to acceptable levels given current knowledge of radiation effects. These limits, in terms of exposure, are an average of approximately 5 R/yr (12 R/yr maximum) for mature adults, to an upper bound of 150 R over a lifetime. This represents an approximate average exposure rate of about 6×10^{-4} R/hr.

However, in the post-attack environment, people are expected to be more concerned with immediate survival than with longer term ill effects. With proper protection or shorter exposure times, people could work in an environment of considerably higher dose rates. This would be necessary to salvage usable food, materials, or machinery. The risk/benefit question would have to be answered by individual judgment. Table 17 lists sample dose rates that might occur in the attacked regions over a period of time. Column 1 of this table lists representative times. At the bottom of each following column is the number representing the total accumulated dose received in an area over a long period of time (many years) for various initial dose rates, assuming continuous exposure from the time of attack. These numbers denote the fallout contours shown in Figure 6. The other numbers in the table are the dose rates at the corresponding times. It should also be noted that high radiation "hot spots" will probably exist for even longer periods of time. These hot spots may arise from the early fallout or may be due to wind and rain, which as time goes on may reduce the radioactive particles in one area but concentrate them in another. The heavily affected areas will have to be monitored on a periodic basis to detect and isolate these hot spots. Vegetation and animal life may also concentrate, to some degree, radioactive substances within their tissue.

D. IMMEDIATE CASUALTIES

Tables 18 through 33 provide a breakdown of fatalities and injuries from blast and radiation in the blast-risk counties under the various levels of protection and/or evacuation associated with different warning times and different levels of population response. For example, only 10 percent of the affected population was assumed to build expedient shelters, given 24 hours warning.

The numbers provided in this report are the result of a computer analysis based on educated assumptions; they should not be considered as a precise prediction of the consequences of an attack.

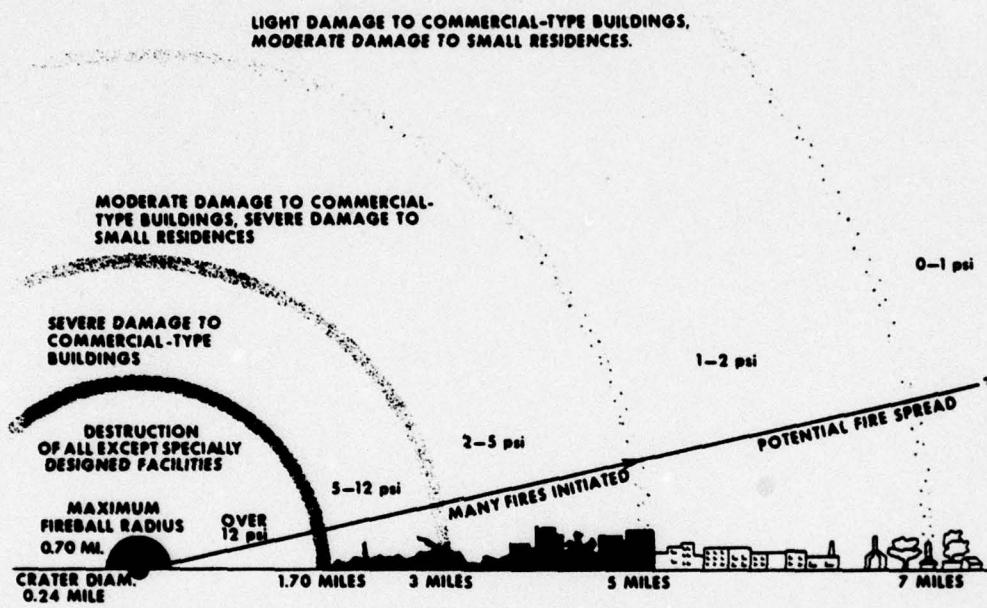


FIGURE 1. DIRECT EFFECTS OF 1-MT BLAST (Surface Burst)

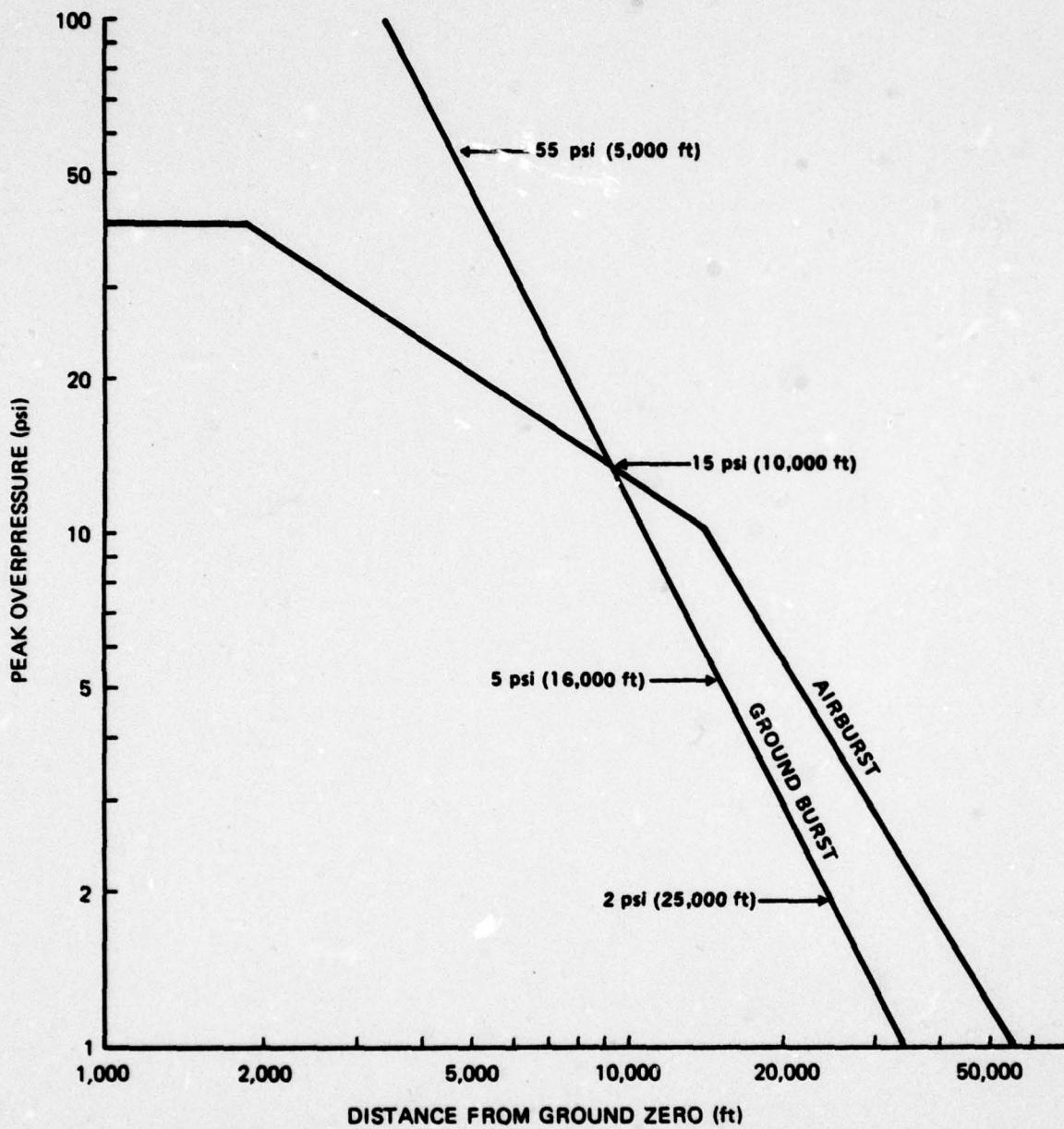


FIGURE 2. PEAK OVERPRESSURE AS A FUNCTION OF DISTANCE FROM GROUND ZERO (Curves are for a 1-megaton ground burst and a 1-megaton airburst set to maximize the 10-psi area coverage)

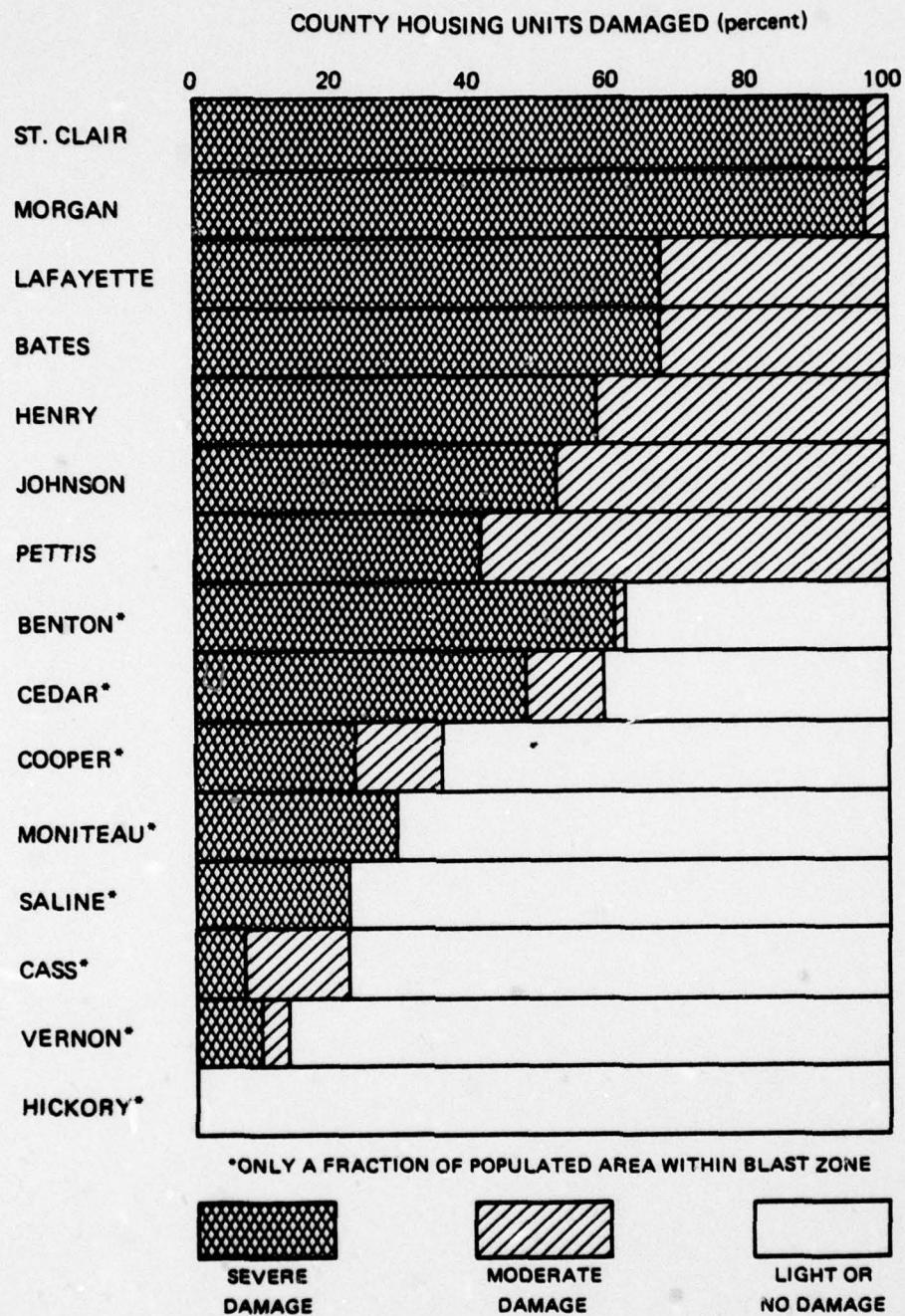
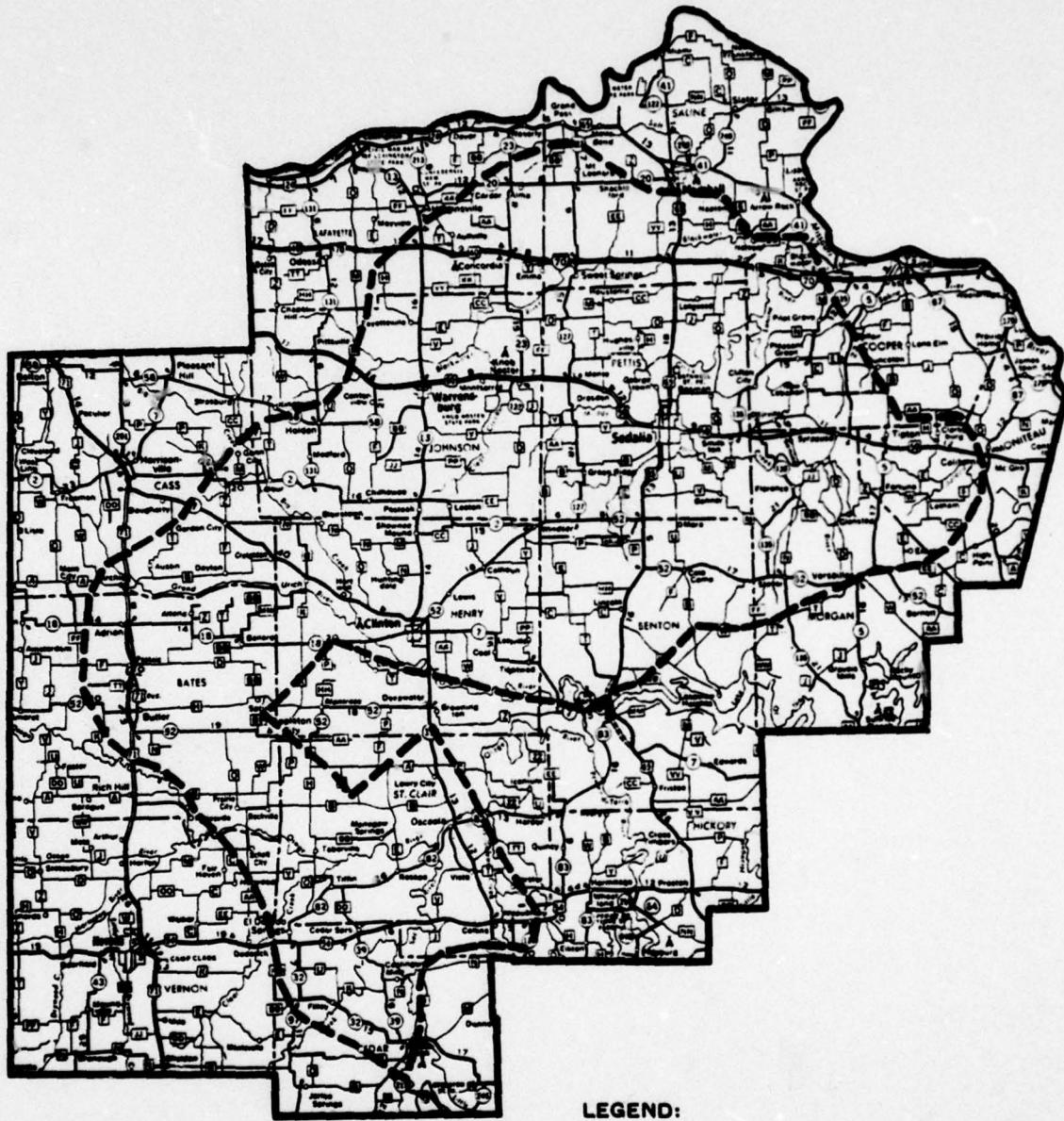


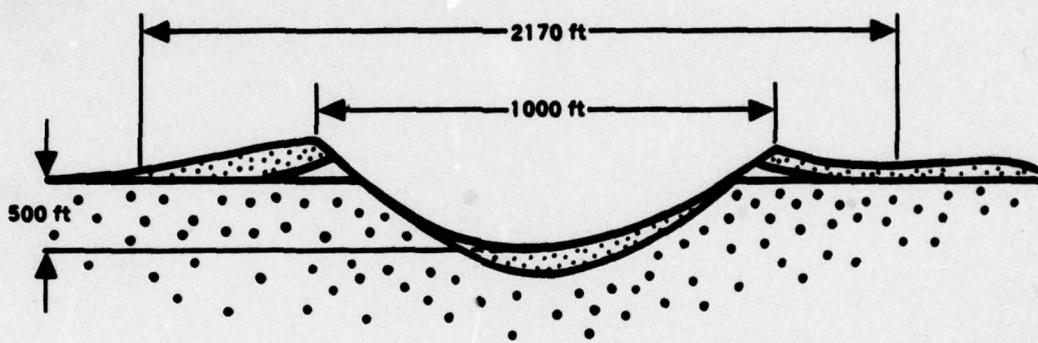
FIGURE 3. PERCENT OF COUNTY HOUSING UNITS DAMAGED



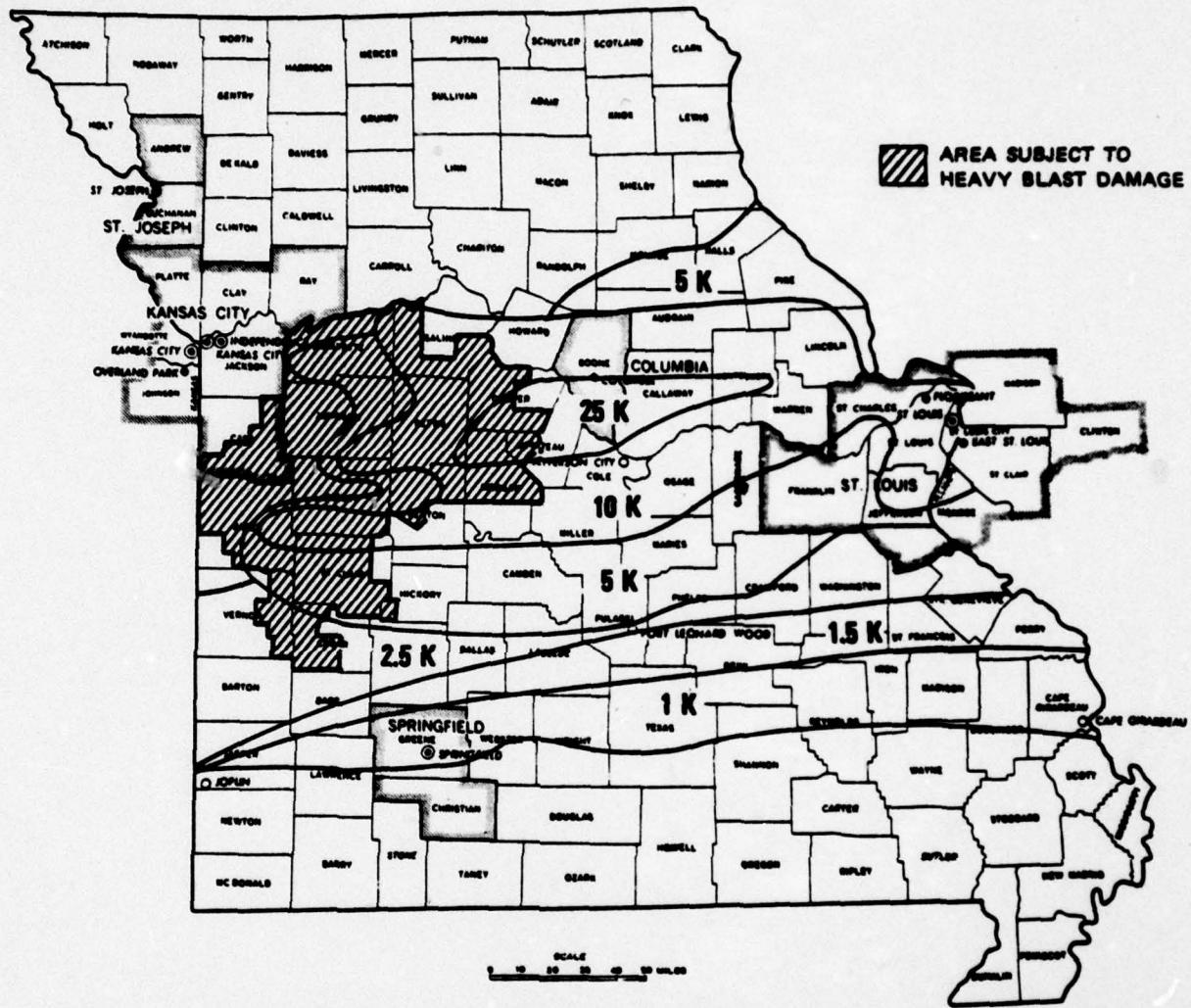
LEGEND:

— Zone in which road traffic
may be disrupted by craters
and damaged bridges

FIGURE 4. BLAST-RISK COUNTIES OF MISSOURI



**FIGURE 5. APPROXIMATE CRATER DIMENSIONS FOR
A 1.2-MT SURFACE BURST**



**FIGURE 6. MISSOURI, BLAST-RISK AREAS AND ESTIMATED FALLOUT PATTERN
(Accumulated Dose in thousands of Roentgens)**

TABLE 1
BLAST DAMAGE--MISSOURI
TOTAL RISK COUNTIES

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	113,882(100%)	49,370(43.4%)	25,720(22.6%)
Emergency Operating Centers	4	1	2
Hospital Beds	979	187	359
Radio and TV	21		2
Grocery Distributors	8		4
Meat Packers	4	1	
Poultry Processors	3		
Prepared Feed Storage	39	19	7

TABLE 2
BLAST DAMAGE--MISSOURI
BATES COUNTY

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	6,321(100%)	4,204(66.5%)	2,117(33.5%)
Emergency Operating Centers			
Hospital Beds	90	90	
Radio and TV	2		2
Grocery Distributors			
Meat Packers			
Poultry Processors			
Prepared Feed Storage	1	1	

TABLE 3
BLAST DAMAGE--MISSOURI
BENTON COUNTY

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	7,183(100%)	4,370(60.8%)	89(1.2%)
Emergency Operating Centers			
Hospital Beds			
Radio and TV			
Grocery Distributors			
Meat Packers			
Poultry Processors			
Prepared Feed Storage	1	1	

TABLE 4
BLAST DAMAGE--MISSOURI
CASS COUNTY

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	15,947(100%)	1,108(6.9%)	2,263(14.2%)
Emergency Operating Centers			
Hospital Beds	50		
Radio and TV	1		
Grocery Distributors			
Meat Packers			
Poultry Processors			
Prepared Feed Storage	7	1	2

TABLE 5
BLAST DAMAGE--MISSOURI
CEDAR COUNTY

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	4,199(100%)	2,008(47.8%)	462(11%)
Emergency Operating Centers			
Hospital Beds	34		34
Radio and TV	2		
Grocery Distributors	1		1
Meat Packers			
Poultry Processors			
Prepared Feed Storage	1		1

TABLE 6
BLAST DAMAGE--MISSOURI
COOPER COUNTY

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	5,108(100%)	1,150(22.5%)	659(12.9%)
Emergency Operating Centers	1		
Hospital Beds	70		
Radio and TV	2		
Grocery Distributors	1		
Meat Packers			
Poultry Processors			
Prepared Feed Storage	3	1	1

TABLE 7
BLAST DAMAGE--MISSOURI
HENRY COUNTY

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	7,500(100%)	4,329(57.7%)	3,171(42.3%)
Emergency Operating Centers	1		1
Hospital Beds	100		
Radio and TV	1		
Grocery Distributors	1		1
Meat Packers	1		
Poultry Processors			
Prepared Feed Storage	2	2	

TABLE 8
BLAST DAMAGE--MISSOURI
HICKORY COUNTY

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	2,573(100%)	0%	0%
Emergency Operating Centers			
Hospital Beds			
Radio and TV			
Grocery Distributors			
Meat Packers			
Poultry Processors			
Prepared Feed Storage			

TABLE 9

BLAST DAMAGE--MISSOURI
JOHNSON COUNTY

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	11,960(100%)	6,178(51.7%)	5,782(48.3%)
Emergency Operating Centers	1	1	
Hospital Beds	100		100
Radio and TV	2		
Grocery Distributors			
Meat Packers			
Poultry Processors			
Prepared Feed Storage	2	1	1

TABLE 10

BLAST DAMAGE--MISSOURI
LAFAYETTE COUNTY

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	9,859(100%)	6,661(67.6%)	3,198(32.4%)
Emergency Operating Centers			
Hospital Beds	131		77
Radio and TV	3		
Grocery Distributors			
Meat Packers			
Poultry Processors			
Prepared Feed Storage	6	4	2

TABLE 11

BLAST DAMAGE--MISSOURI
MONITEAU COUNTY

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	4,201(100%)	1,214(28.9%)	0%
Emergency Operating Centers			
Hospital Beds			
Radio and TV			
Grocery Distributors			
Meat Packers	1	1	
Poultry Processors	1		
Prepared Feed Storage	5	2	

TABLE 12

BLAST DAMAGE--MISSOURI
MORGAN COUNTY

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	7,082(100%)	6,844(96.6%)	238(3.4%)
Emergency Operating Centers			
Hospital Beds			
Radio and TV			
Grocery Distributors			
Meat Packers	1		1
Poultry Processors			
Prepared Feed Storage	2	1	

TABLE 13
BLAST DAMAGE--MISSOURI
PETTIS COUNTY

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	12,581(100%)	5,156(41%)	7,425(59%)
Emergency Operating Centers	1		1
Hospital Beds	148		148
Radio and TV	5		
Grocery Distributors	1		1
Meat Packers	1		
Poultry Processors	2		
Prepared Feed Storage	1	1	

TABLE 14
BLAST DAMAGE--MISSOURI
ST. CLAIR COUNTY

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	3,746(100%)	3,631(96.9%)	115(3.1%)
Emergency Operating Centers			
Hospital Beds	66	66	
Radio and TV			
Grocery Distributors			
Meat Packers			
Poultry Processors			
Prepared Feed Storage	1	1	

TABLE 15
BLAST DAMAGE--MISSOURI
SALINE COUNTY

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	8,969(100%)	1,882(21%)	0(0%)
Emergency Operating Centers			
Hospital Beds	128	31	
Radio and TV	2		
Grocery Distributors	1		
Meat Packers	1		
Poultry Processors			
Prepared Feed Storage	6	2	

TABLE 16
BLAST DAMAGE--MISSOURI
VERNON COUNTY

Category	Total Units	Level of Damage	
		Severe	Moderate
Housing	6,653(100%)	635(9.5%)	201(3%)
Emergency Operating Centers			
Hospital Beds	62		
Radio and TV	1		
Grocery Distributors	2		
Meat Packers			
Poultry Processors			
Prepared Feed Storage	1	1	

TABLE 17
DOSE RATE AT VARIOUS TIMES AFTER THE ATTACK

Time Since Attack	Dose Rate (R/hr)				
	10,000	5,000	2,000	1,000	200
1 hour	10,000	5,000	2,000	1,000	200
1 day	200	100	40	20	4
1 week	20	10	4	2	0.4
1 month	3.8	1.9	0.73	0.38	0.07
1 year	0.18	0.09	0.036	0.018	0.0036
5 years	0.027	0.013	0.005	0.0027	0.0005
10 years	0.012	0.006	0.0024	0.0012	0.00024

Maximum Accumulated Dose (R)	50,000	25,000	10,000	5,000	1,000

TABLE 18

FATALITIES AND INJURIES--MISSOURI
 TOTAL RISK COUNTIES
 (1976 Estimated Population: 299,581)

Warning Time Civil Defense Program	1-2 weeks		24 hours		15-30 minutes	
	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Injured	Killed by Fallout
Current CD	52,620	83,510	41,140	57,150	94,210	39,650
Crisis Relocation	8,040	11,180	16,840	20,990	42,330	17,550
Expedient Shelter	---	---	---	53,210	83,260	38,930
Dedicated Blast Shelter	6,380	11,970	8,730	---	---	12,750
						18,660
						9,150

TABLE 19
FATALITIES AND INJURIES--MISSOURI
BATES COUNTY
(1976 Estimated Population: 15,924)

Warning Time Civil Defense Program	1-2 weeks			24 hours			15-30 minutes		
	Killed by Blast	Injured	Killed by Blast	Injured	Killed by Blast	Injured	Killed by Blast	Injured	Injured
Current CD	5,830	380	4,040	6,320	500	4,180	7,370	1,360	4,120
Crisis Relocation	820	0	540	2,300	120	1,150	7,020	670	3,360
Expedient Shelter	---			5,880	270	3,970		---	
Dedicated Blast Shelter	150	0	100		---		300	0	230

TABLE 20

FATALITIES AND INJURIES--MISSOURI
 BENTON COUNTY
 (1976 Estimated Population: 11,449)

Warning Time Civil Defense Program	1-2 weeks			24 hours			15-30 minutes		
	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured
Current CD	3,120	5,200	1,700	3,320	5,640	1,590	3,630	7,810	0
Crisis Relocation	470	820	2,570	1,230	4,910	510	3,580	6,090	1,460
Expedient Shelter	---	---	---	3,210	5,230	1,470	---	---	---
Dedicated Blast Shelter	0	1,440	1,760	---	---	---	10	2,810	810

TABLE 21

FATALITIES AND INJURIES--MISSOURI
 CASS COUNTY
 (1976 Estimated Population: 47,627)

Warning Time Civil Defense Program	1-2 weeks			24 hours			15-30 minutes		
	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured
Current CD	1,090	190	2,540	1,230	280	2,740	1,660	970	2,830
Crisis Relocation	130	0	340	480	100	1,050	1,530	440	2,990
Expedient Shelter	---	---		1,060	190	2,490	---	---	
Dedicated Blast Shelter	0	0	0	---	---		0	0	0

TABLE 22

FATALITIES AND INJURIES--MISSOURI
 CEDAR COUNTY
 (1976 Estimated Population: 10,564)

Warning Time Civil Defense Program	1-2 weeks			24 hours			15-30 minutes		
	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured
Current CD	490	1,400	2,240	590	2,060	2,160	1,120	3,850	4,370
Crisis Relocation	30	0	230	160	410	1,830	850	2,510	1,940
Expedient Shelter		---			460	360	3,140	---	
Dedicated Blast Shelter	0	0	10			---		0	200
									50

TABLE 23
FATALITIES AND INJURIES--MISSOURI
COOPER COUNTY
(1976 Estimated population: 14,572)

Warning Time	1-2 weeks			24 hours			15-30 minutes		
	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured
Civil Defense Program									
Current CD	2,080	10,160	640	2,250	11,050	380	2,610	11,960	0
Crisis Relocation	310	1,370	980	850	3,640	0	2,530	8,630	0
Expedient Shelter	---			2,140	10,530	10	---		
Dedicated Blast Shelter	180	990	540	---			350	1,290	390

TABLE 24

FATALITIES AND INJURIES--MISSOURI
 HENRY COUNTY
 (1976 Estimated Population: 18,780)

Warning Time Civil Defense Program	1-2 weeks		24 hours		15-30 minutes	
	Killed by Blast	Injured	Killed by Blast	Injured	Killed by Blast	Injured
Current CD	3,890	4,990	2,160	4,220	6,100	1,950
Crisis Relocation	590	190	680	1,590	1,940	780
Expedient Shelter	---				3,980	4,940
Dedicated Blast Shelter					40	---
	420	0				
						840
						0
						70

TABLE 25

FATALITIES AND INJURIES--MISSOURI

HICKORY COUNTY

(1976 Estimated Population: 6,040)

Warning Time Civil Defense Program	1-2 weeks			24 hours			15-30 minutes		
	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured
Current CD	0	2,150	3,120	0	2,400	3,110	10	6,020	0
Crisis Relocation	0	30	330	0	4,380	1,090	10	2,660	3,110
Expedient Shelter	---	---	0	2,030	3,110	---	---	---	---
Dedicated Blast Shelter	0	270	1,500	---	---	0	1,260	2,800	---

TABLE 26
FATALITIES AND INJURIES--MISSOURI
JOHNSON COUNTY
(1976 Estimated Population: 34,185)

Warning Time Civil Defense Program	1-2 weeks		24 hours		15-30 minutes	
	Killed by Blast	Injured	Killed by Blast	Injured	Killed by Blast	Injured
Current CD	11,230	3,440	7,880	12,030	5,080	7,530
Crisis Relocation	2,110	0	820	4,470	1,620	2,190
Expedient Shelter	---			11,590	4,060	7,330
Dedicated Blast Shelter	3,770	0	20	---		7,550
						0
						30

TABLE 27

FATALITIES AND INJURIES--MISSOURI
 LAFAYETTE COUNTY
 (1976 Estimated Population: 28,303)

Warning Time Civil Defense Program	1-2 weeks		24 hours		15-30 minutes	
	Killed by Blast	Injured	Killed by Blast	Injured	Killed by Blast	Injured
Current CD	9,190	1,060	5,840	9,930	1,390	6,080
Crisis Relocation	1,340	0	890	3,500	330	2,240
Expedient Shelter	---				860	5,940
Dedicated Blast Shelter	570	0	280	---		
					1,130	0
						570

TABLE 28

FATALITIES AND INJURIES--MISSOURI
 MONITEAU COUNTY
 (1976 Estimated Population: 11,475)

Warning Time Civil Defense Program	1-2 weeks		24 hours		15-30 minutes	
	Killed by Blast	Injured	Killed by Blast	Injured	Killed by Blast	Injured
Current CD	850	8,710	520	960	10,020	290
Crisis Relocation	100	7,560	960	380	9,010	10
Expedient Shelter		---		830	9,350	60
Dedicated Blast Shelter	60	7,390	750	---		120
						7,820
						330

TABLE 29

FATALITIES AND INJURIES--MISSOURI
 MORGAN COUNTY
 (1976 Estimated Population: 12,165)

Warning Time Civil Defense Program	1-2 weeks			24 hours			15-30 minutes		
	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured
Current CD	2,870	7,480	530	3,150	7,950	390	3,870	8,300	0
Crisis Relocation	390	470	2,940	1,210	4,830	70	3,690	8,280	200
Expedient Shelter	---	---	---	2,910	7,600	210	---	---	---
Dedicated Blast Shelter	0	1,040	1,560	---	---	---	0	2,260	490

TABLE 30

FATALITIES AND INJURIES--MISSOURI
 PETTIS COUNTY
 (1976 Estimated Population: 35,310)

Warning Time Civil Defense Program	1-2 weeks			24 hours			15-30 minutes		
	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured
Current CD	5,320	21,510	3,760	5,880	23,740	3,200	7,780	27,530	0
Crisis Relocation	750	430	2,140	2,120	6,780	740	7,040	20,030	2,050
Expedient Shelter	---	---	---	5,350	22,800	2,370	---	---	---
Dedicated Blast Shelter	510	0	80	---	---	---	1,020	0	150

TABLE 31

FATALITIES AND INJURIES--MISSOURI
 ST. CLAIR COUNTY
 (1976 Estimated Population: 9,419)

Warning Time Civil Defense Program	1-2 weeks		24 hours		15-30 minutes	
	Killed by Blast	Injured	Killed by Fallout	Injured	Killed by Blast	Injured
Current CD	3,370	1,520	3,100	3,650	1,880	2,990
Crisis Relocation	530	10	470	1,370	1,000	1,000
Expedient Shelter	---			3,410	1,670	2,890
Dedicated Blast Shelter	450	20	140	---		900
						90
						220

TABLE 32
 FATALITIES AND INJURIES--MISSOURI
 SALINE COUNTY
 (1976 Estimated Population: 23,790)

Warning Time Civil Defense Program	1-2 weeks		24 hours		15-30 minutes	
	Killed by Blast	Injured	Killed by Blast	Injured	Killed by Blast	Injured
Current CD	2,210	13,520	1,850	2,430	14,080	1,810
Crisis Relocation	290	300	2,660	870	2,880	960
Expedient Shelter	---	---	---	2,130	13,140	1,680
Dedicated Blast Shelter	80	820	1,820	---	---	150
						2,080
						2,760

TABLE 33

FATALITIES AND INJURIES--MISSOURI
 VERNON COUNTY
 (1976 Estimated Population: 19,978)

Warning Time Civil Defense Program	1-2 weeks			24 hours			15-30 minutes		
	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured	Killed by Blast	Killed by Fallout	Injured
Current CD	1,080	1,800	1,220	1,190	2,040	1,250	1,370	3,210	3,630
Crisis Relocation	170	0	290	460	380	3,930	1,340	2,530	1,040
Expedient Shelter	---	---	---	1,060	230	1,950	---	---	---
Dedicated Blast Shelter	190	0	120	---	---	---	380	850	250